

# Work Order ID 70721

Monday, June 13, 2011 3:14:07 PM



Page 1

Item ID: D206-667-203

Accept



Setup Start



Revision ID:

Item Name: Crosstube Aft

Stop



Start Date: 6/13/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 6/20/2011 Req'd Qty: 1.00

Customer:

Reference:

Approvals: Process Plan: *[Signature]*

Date: *11-06-13*

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
<b>Draw Nbr</b>	<b>Revision Nbr</b>								
D206-667-243	Rev C <i>CON 11-6-15</i>								
100		0.00							
	DOCUMENT CONTROL								
DC	<b>Memo</b>	0.00							
Document Control	Photocopy bluefile and create labels as per PPP D206-667-203 - CHG 003								
110		0.00							
	BENDING MACHINE - CROSSTUBES								
CNC Bend 2	<b>Memo</b>	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D206-667-243 using CNC bender program 206L-AF								
120		0.00							
	QC15- Crosstube Dimensional Check								
QC	<b>Memo</b>	0.00							
Quality Control									

*Handwritten notes and signatures:*  
*004 8.11.10/17*  
*MLJ 11-10-17*  
*SAD 11-09-16*  
*DP*  
*8.11.10/13*

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

**Work Order ID 70721**

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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130		0.00							
	Crosstubes								
Crosstubes									
Crosstubes									
	<b>Memo</b>	0.00							
	1-Drill pilot holes in tube using drill Jig DT8583 & DT8584 as per Dwg D206-667-243 and drill table DT8577. Locate hole #6 for towers as per QSI 10. Drill all (3) top holes.								
	2-Drill and Ream all holes in tube to finish size using drill Jig DT8583 & DT8584 as per Dwg D206-667-243 Check dimensions between holes on all four sides.								
	3-Flip tube and switch drilling Jigs from right to left, left to right. Locate Jigs off existing holes using "T" pins.								
	4-Drill pilot holes using drill Jig DT8583 & DT8584 as per Dwg D206-667-243. Drill only the top (2) holes.								
	5-Drill & ream the top (2) holes to finish size using drill Jig DT8583 & DT8584 as per Dwg D206-667-243								
	6-Drill Fwd rivet holes using drill Jig DT8789FWD as per Dwg D206-667-143. Note: Fwd side has 3x top holes.								
	7-Drill Aft rivet holes using drill Jig DT8789 as per Dwg D206-667-243.								
	8-C'sink holes as per Dwg D206-667-243.								
	9-Scribe part # and batch # using vibrating stylus as per Dwg D206-667-243 Inside of Cuff (Do not engrave on outside of tube)								
	10-Deburr & Inspect for surface damage. Repair damage within limits as per								

BT  
11-10-03

JW 11-10-03

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Dwg  
D206-667-243

140

Crosstubes Chemical Conversion

0.00

~~81-11-10-04~~  
JW 11-03-03



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

150

QC3- Inspect Part Finish

0.00



QC

Memo

0.00

Quality Control

160

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

Sullivan

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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[illegible]

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**Accept**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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**Setup Start**

**Stop**

**Cust Item ID:**

**Customer:**

**Reference:**

Run Start

**Stop**

170

Outsource process - NDT per QSI038 4.1

0.00

**PAGE NO.** \_\_\_\_\_  
**DATE** \_\_\_\_\_  
**SUBJECT** \_\_\_\_\_  
**TOPIC** \_\_\_\_\_  
**NAME** \_\_\_\_\_  
**ROLL NO.** \_\_\_\_\_  
**SECTION** \_\_\_\_\_  
**TEACHER'S NAME** \_\_\_\_\_  
**TEACHER'S SIGNATURE** \_\_\_\_\_  
**STUDENT'S SIGNATURE** \_\_\_\_\_  
**MARKS** \_\_\_\_\_

Outsource2

## Memo

0.00

### Outsource process - NDT

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 15101

LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

180

0.00

[illegible]

## Packaging

### Packaging

## Memo

0.00

## Packaging

Ensure copy of NDT results attached to work order.

190

QC5- Inspect part completeness to step on W/O

0.00

[illegible]

QC

## Memo

0.00

## Quality Control

Ensure results are as per Dwg D206-667-243

1411-10-C

Решено 10/6 (1)

11 10 06 (T)

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



**Work Order ID 70721**

Monday, June 13, 2011 3:14:07 PM

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Item ID: D206-667-203

Accept

Revision ID:

Item Name: Crosstube Aft

Start Date: 6/13/2011 Start Qty: 1.00

Required Date: 6/20/2011 Req'd Qty: 1.00

Reference:

Cust Item ID:

Customer:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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200



SprayPaint

Spray Painting

SprayPaint

Memo

1-Prime inside and outside crosstube as per QSI 005 4.2  
2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: 10:00

Finish Time: 11:00

PAINT:

Start Time: 3:00

Finish Time: 4:30

0.00

0.00

25	11	10	05
----	----	----	----

210



QC

Quality Control

QC14- Inspect Spray Paint

Memo

Wrap in plastic bag to protect from scratches

0.00

0.00

85	11	10	09
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Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**Work Order ID 70721**

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Item ID: D206-667-203

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Revision ID:

Stop



Item Name: Crosstube Aft

Start Date: 6/13/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 6/20/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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220

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Install nut plates as per Dwg D206-667-243.

RT 11-10-15  
DHO

230

0.00



Skidtubes

Crosstubes

Memo

0.00

Crosstubes

1-Install support using 0.03" to 0.06" thick layer of magnobond 6398 per QSI 015. Let cure for 12h after installation and prior to packaging. Note: (3) top holes should be facing up.  
A/R Magnobond 6398 : 118234

RT 11-10-15

2-Install supports and clamps as per Dwg D206-667-243. Torque clamps to 80-100 in lb

Dart Aerospace Ltd

W/O: 70721		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D206-667-203 PAR #: N/A Fault Category: X-tubes NCR: Yes No DQA: A Date: 11.10.22  
 Resolution: Scrap Disposition: Scrap QA: N/C Closed: ✓ Date: 11/10/25

NCR: 11-910		WORK ORDER NON-CONFORMANCE (NCR) 4.79						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11-10-15	220	1 MS20601AD4 W-10 rivet broke off too low inside rivet hole while being installed R.C. rivet failure process	<u>B</u> Q55412	carefully remove rivet + install new one MS20601AD4 W-10 x1 <u>B118675</u>	<u>ET</u> 11-10-15	<u>11/10/17</u>	<u>Q55412</u>	<u>11/10/17</u>

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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop



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240  QC Quality Control	QC5- Inspect part completeness to step on W/O  Memo	0.00  0.00				<u>11</u>	<u>11</u>	<u>10</u>	<u>17</u> (P)
250  Packaging Packaging	Pick Kit  Memo	0.00  0.00				<u>11/10/11</u>			
260  QC Quality Control	QC4- 100% Inspect kits for completeness  Memo	0.00  0.00				<u>8/10/11</u>			<u>17</u> (P)

**Dart Aerospace Ltd**

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270

0.00



Packaging

Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPP D206-667-203

Location: \_\_\_\_\_

PPP Rev: \_\_\_\_\_

280

0.00



QC

QC21- Final Inspection - Work Order Release

Memo

0.00

Quality Control

mf 11-10-18

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
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# Picklist Print

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Page 1

Work Order ID: 70721

Parent Item: D206-667-203

Parent Item Name: Crosstube Aft



Start Date: 6/13/2011

Required Date: 6/20/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:F 05.09.01 Add holes for compatibility with Bell Skidtubes KJ/JLM  
 IPP Rev:G 08-06-03 update as per DS19415 (ECN1198) DD verified by:ec  
 IPP Rev:H 08-07-18 remove thread masking in step 12 DD verified by:EC  
 IPP Rev:I 08-12-15 add magnobond DD verified by:EC  
 IPP Rev J 09.01.06 ECN 08-562 EC verified by:DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D206-667-203TRN 		Manufactured	No			220	Each	0.0000	1	1			
Crosstube Turning Detail													
D2873-043 		Manufactured	No			220	Each	28.0000	2	2			
Nut Plate Assembly													
<div style="display: flex; justify-content: space-between;"> <div> <p><u>Location</u></p> <p>LG 28</p> <p>68084 8</p> <p>68801 20</p> </div> <div> <p><u>Loc Qty</u></p> <p>73605</p> </div> <div> <p><u>Loc Code</u></p> <p></p> </div> </div>													
D2873-045 		Manufactured	No			220	Each	23.0000	2	2			
Nut Plate Assembly													
<div style="display: flex; justify-content: space-between;"> <div> <p><u>Location</u></p> <p>LG 20</p> <p>68800 20</p> <p>LG052 3</p> <p>65992 1</p> <p>67741 2</p> </div> <div> <p><u>Loc Qty</u></p> <p>73529</p> </div> <div> <p><u>Loc Code</u></p> <p></p> </div> </div>													

B72978



SAD 11-09-16

73605



85 11-10-15

73529



85 11-10-15



**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

Monday, June 13, 2011 3:14:13 PM

Page 2

Work Order ID: 70721

Parent Item: D206-667-203

Parent Item Name: Crosstube Aft

Start Date: 6/13/2011

Required Date: 6/20/2011

Start Qty: 1.00

Required Qty: 1.00

D2892-1 Manufactured No

230 Each

30.0000

2

2



Support

72585



BT

11-10-15

Location

Loc Qty

Loc Code

LG052

30

42785

14

68808

14

70115

2

D3595-063-450 Manufactured No

230 Each

97.0000

4

4



RUBBER CUSHION

72967



BT

11-10-15

Location

Loc Qty

Loc Code

LG

97

67353

3

68893

34

70113

60

MS20601-AD4W10 Purchased No

230 Each

158.0000

14

14



RIVET

118675



BT

11-10-15

Location

Loc Qty

Loc Code

LG051

158

116186

3

117193

55

117676

100

MS21920-22 Purchased No

230 Each

79.0000

4

4



Clamp(per MIL-DTL-8783C)

118186



BT

11-10-15

Location

Loc Qty

Loc Code

LG050

79

116207

7

117279

22

117506

50

Monday, June 13, 2011 3:14:14 PM

Shop Packet Print

Page 2

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

Monday, June 13, 2011 3:14:14 PM

Page 3

Work Order ID: 70721

Parent Item: D206-667-203

Parent Item Name: Crosstube Aft

Start Date: 6/13/2011

Required Date: 6/20/2011

Start Qty: 1.00

Required Qty: 1.00

AN5-10A  
Bolt

Purchased No

250 Each

328.0000

10 10

Location

Loc Qty

Loc Code

ST337

328

117313

103

117795

125

117872

100

AN5-32A  
Bolt

Purchased No

250 Each

204.0000

4 4

Location

Loc Qty

Loc Code

ST340

204

115589

19

117161

50

117514

50

117688

25

117872

60

AN5-34A  
Bolt

Purchased No

250 Each

114.0000

4 4

Location

Loc Qty

Loc Code

ST340

114

116704

4

117010

20

117366

20

117794

70

AN960JD516

NAS1149D0563J

Purchased No

250 Each

0.0000

18 18

Washer

1148206

11/10/17

Monday, June 13, 2011 3:14:14 PM

Shop Packet Print

Page 3

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
							/

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

Page 4

Monday, June 13, 2011 3:14:14 PM

Work Order ID: 70721



Parent Item: D206-667-203



Parent Item Name: Crosstube Aft

Start Date: 6/13/2011

Required Date: 6/20/2011

Start Qty: 1.00

Required Qty: 1.00

MS21042LS

Purchased

No

250

Each

1,056.000

4



Nut

Location

Loc Qty

Loc Code

ST300

1056

116105

96

116548

260

117441

500

117591

100

117611

100

Monday, June 13, 2011 3:14:14 PM

Shop Packet Print

Page 4

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

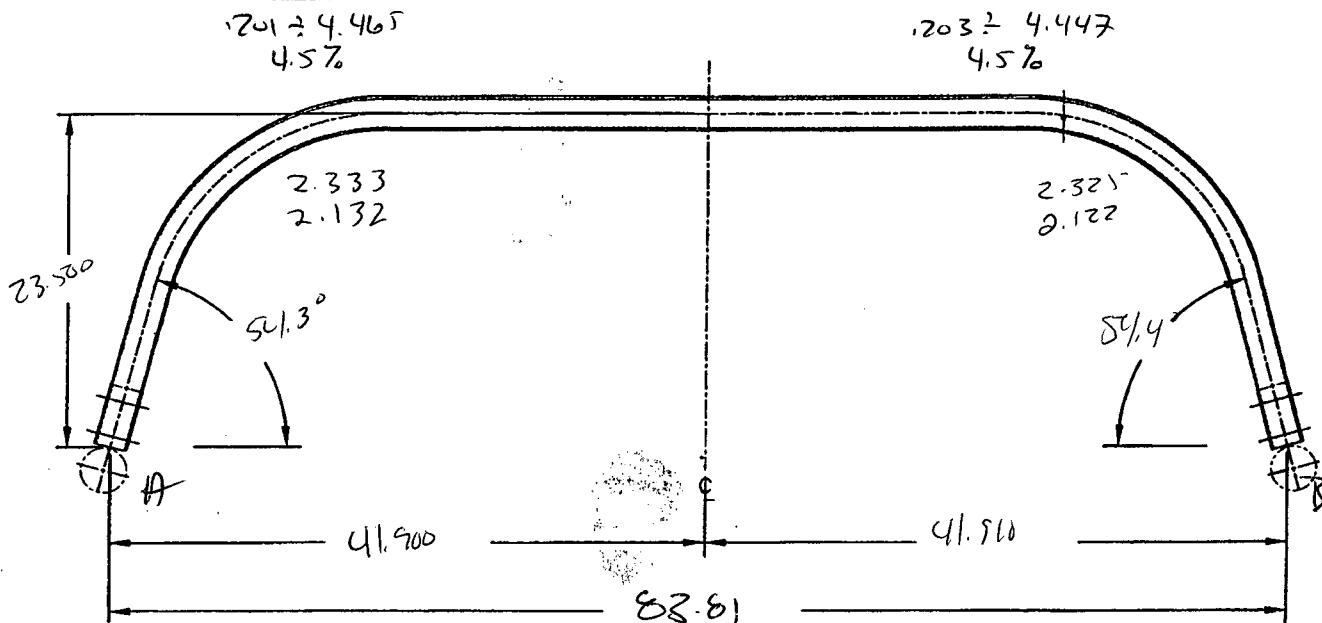
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



<b>DART AEROSPACE LTD</b>	<b>Work Order:</b>	70721
<b>Description:</b> Crosstube High Aft (206L)	<b>Part Number:</b>	D206-667-203
<b>Inspection Dwg:</b> D206-667-243 <b>Rev:</b> C		<b>Page 1 of 1</b>

Required Dimension	Min	Max
Height	23.39	23.65
1/2 Span	41.79	42.05
Angle	54	56
Total Span	83.58	84.1



Comments	
SIDE A =	4.5% crush @ 19
SIDE B =	4.5% crush @ 18

QC15 Inspection	8
Date	11/10/03

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	09.11.17	Dwg Rev updated	KJ	
C	09.12.14	Dimensions update per Dwg Rev C	KJ	

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

D206-667-243 EON 11-615 70721

Item	Qty -243	Part Number	Description
1	X	D206-667-243	CROSSTUBE ASSEMBLY (206L HIGH AFT)
2	1	D6004-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2892-1	SUPPORT
6	4	D3595-063-450	RUBBER CUSHION
7	4	MS21920-22	CLAMP
8	14	MS20601AD4W10	RIVET (OR NAS9302B-4-10)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299- 947-100, TYPE II, CLASS 2 ADHESIVE)

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6004-115  
FINISHED LENGTH = 104.91±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D206-667-243" AND BATCH NUMBER ON  
INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 21.9 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY,  
TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE  
TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2892-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER  
QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-22 CLAMPS WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE  
D2892-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS ARE  
LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS  
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT  
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN  
SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

DEO ATTACHED

EON 11-615  
11.07.26

UNDER REVIEW

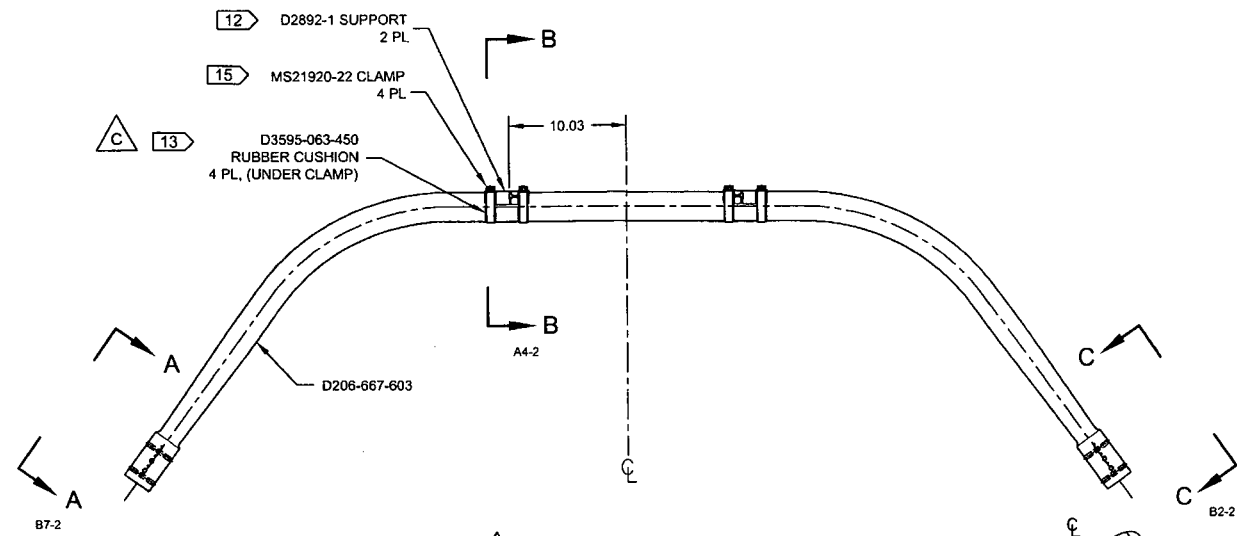
RELEASED

C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-450 WAS D2656-400-773 (ZN D6-2 & A5-2); REMOVED REF. & ADD TOLERANCES (ZN 4-3, C5-3, D3-3); RELOCATED FLAG #6 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUDTUBES	PH	05.07.26
A	NEW ISSUE	CP	00.11.17
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF	DRAWING NO.	REV. C
CHECKED	RF	D206-667-243	SHEET 1 OF 4
MFG. APPR.	RF	TITLE	SCALE
APPROVED	RF	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
DE APPR.	RF	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	
DATE	08.11.06		

8 7 6 5 4 3 2 1

D  
C  
B  
A

D  
C  
B  
A



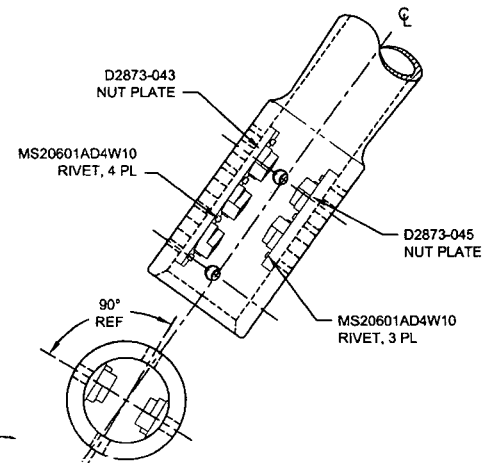
DEO ATTACHED

ECW #11-615  
11.07.26

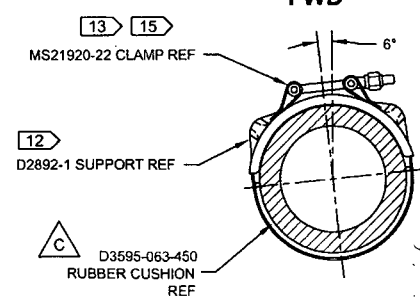
UNDER REVIEW

RELEASED

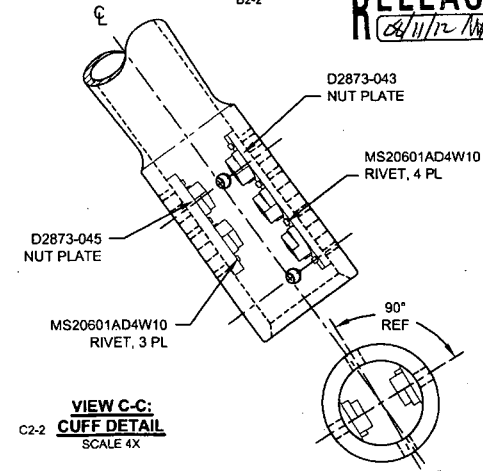
**D206-667-243**  
**ASSEMBLY DETAIL**  
(VIEW LOOKING FWD)



**VIEW A-A:**  
**CUFF DETAIL**  
SCALE 4X



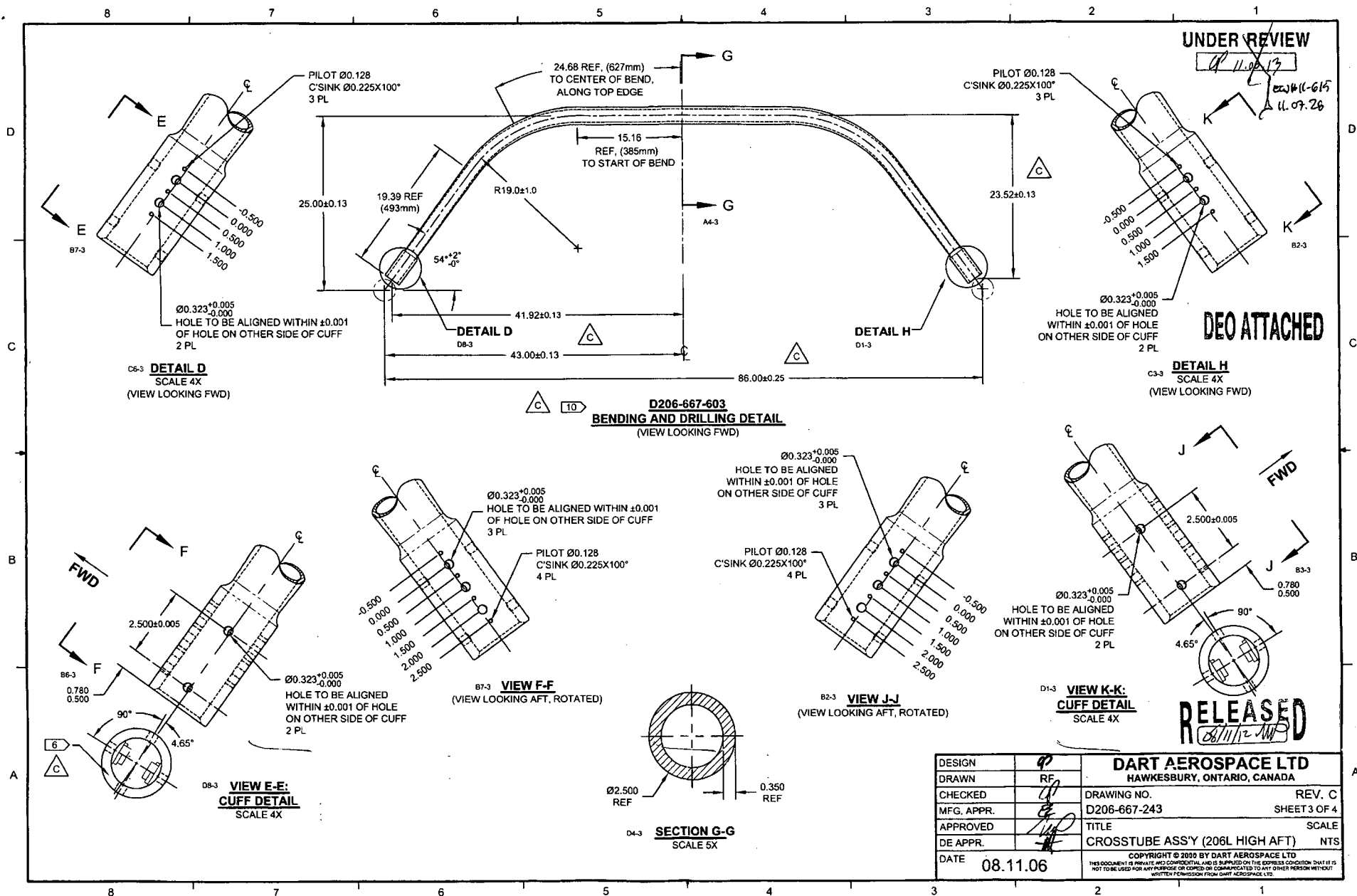
**SECTION B-B**  
SCALE 5X



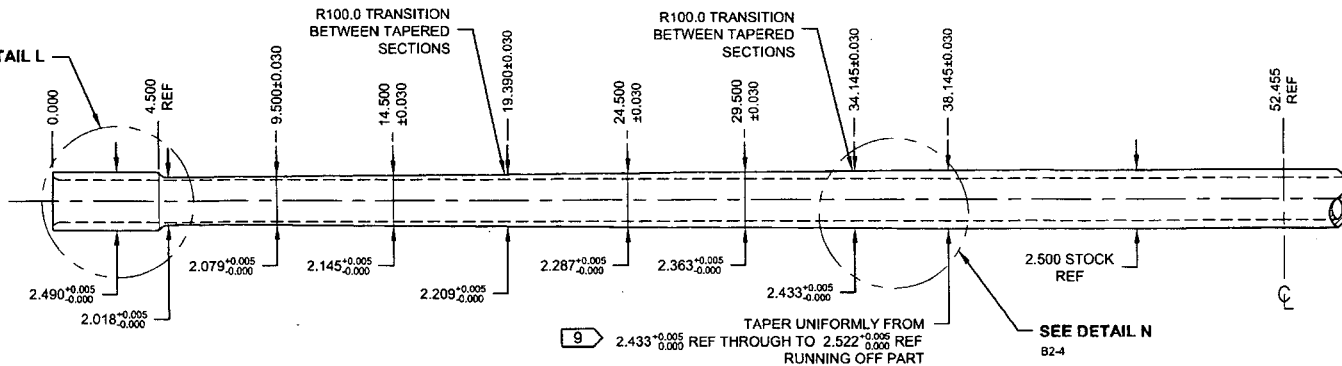
**VIEW C-C:**  
**CUFF DETAIL**  
SCALE 4X

DESIGN	RF	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. C
MFG. APPR.	RF	D206-667-243	SHEET 2 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
DATE	08.11.06	<small>COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

8 7 6 5 4 3 2 1



SEE DETAIL L  
B7-4

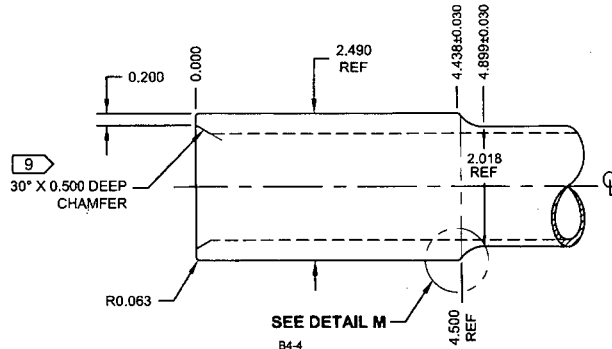


SCW #11-617  
11.07.28

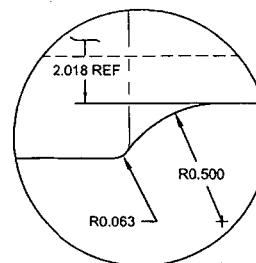
UNDER REVIEW

DEO ATTACHED

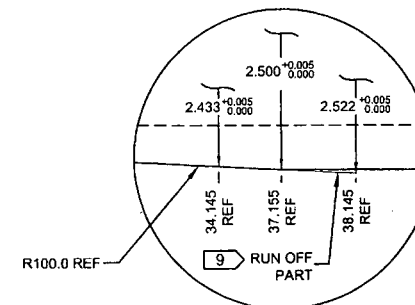
**C TURNING DETAIL**



C7-4 **DETAIL L: CROSSTUBE CUFF**  
NOT TO SCALE



B6-4 **DETAIL M: CUFF TRANSITION**  
NOT TO SCALE



DETAIL N:  
C4-4 **TAPER RUN-OFF**  
NOT TO SCALE

RELEASED  
08/11/2006

DESIGN	9	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9	DRAWING NO.	REV. C
MFG. APPR.	9	D206-667-243	SHEET 4 OF 4
APPROVED	9	TITLE	SCALE
DE APPR.	9	CROSSTUBE ASS'Y (206L HIGH AFT)	NTS
DATE	08.11.06	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR REPRODUCED IN ANY FORM OR BY ANY MEANS WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

DRAWING NO. D206-667-243	TITLE CROSSTUBE ASS'Y (206L HIGH AFT)	REV. C	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>		D.E.O. NO. D206-667-243-C-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>qp</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>RB</i>	APPROVED <i>MP</i>	DE APPR. <i>#</i>			
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/21	DATE 11.07.21			

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

**IS:**

Item	Qty -243	Part Number	Description
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

**WAS:**

9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
---	-----	----------------	---

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

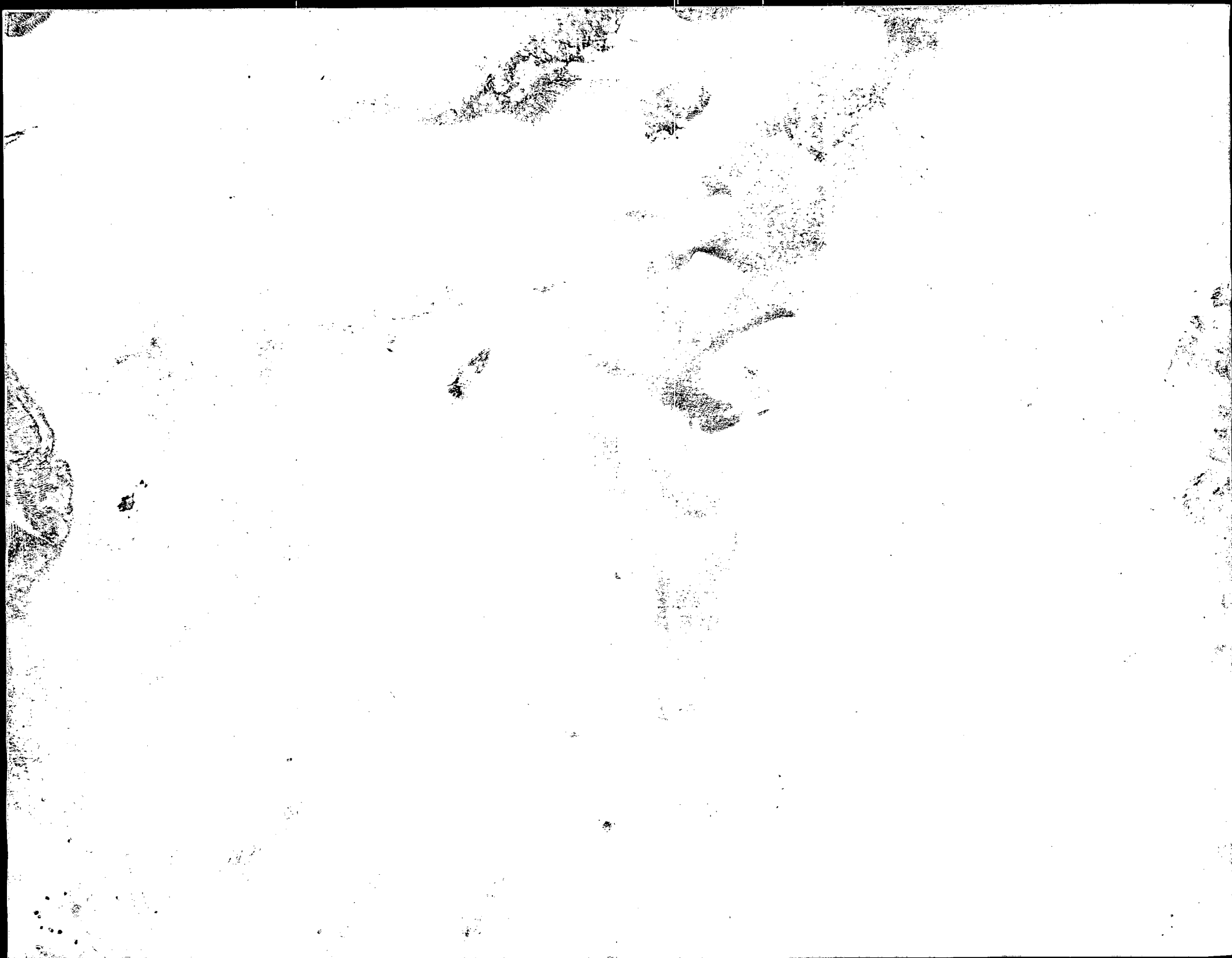
**IS:**

- 12) TO INSTALL D2892-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

**WAS:**

- 12) INSTALL D2892-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
*MP*





## 5.0 PARTS LIST

## 5.1 HIGH GEAR CROSSTUBES

Item	Qty -101	Qty -201	Qty -103	Qty -203	Qty -105	Qty -205	Part Number	Description
	X						D206-667-101	CROSSTUBE INSTALLATION, 206A/B HIGH FWD
		X					D206-667-201	CROSSTUBE INSTALLATION, 206A/B HIGH AFT
			X				D206-667-103	CROSSTUBE INSTALLATION, 206L/L-1/L-3/L-4 HIGH FWD
				X			D206-667-203	CROSSTUBE INSTALLATION, 206L/L-1/L-3/L-4 HIGH AFT
					X		D407-667-105	CROSSTUBE INSTALLATION, 407 HIGH FWD
						X	D407-667-205	CROSSTUBE INSTALLATION, 407 HIGH AFT
1	1						D206-667-141	CROSSTUBE ASSEMBLY, 206A/B HIGH FWD
2		1					D206-667-241	CROSSTUBE ASSEMBLY, 206A/B HIGH AFT
3			1				D206-667-143	CROSSTUBE ASSEMBLY, 206L/L-1/L-3/L-4 HIGH FWD
4				1			D206-667-243	CROSSTUBE ASSEMBLY, 206L/L-1/L-3/L-4 HIGH AFT
5					1		D407-667-145	CROSSTUBE ASSEMBLY, 407 HIGH FWD
6						1	D407-667-245	CROSSTUBE ASSEMBLY, 407 HIGH AFT
10	*2	*2	*2		*2		D2891-1	SUPPORT
11				*2			D2892-1	SUPPORT
12						*1	D2894-1	SUPPORT
13	*4	*4	*4		*4		D3595-063-395	RUBBER CUSHION
14				*4			D3595-063-450	RUBBER CUSHION
15						*2	D3595-075-430	RUBBER CUSHION
16	*4	*4	*4		*4		MS21920-20	CLAMP
17				*4		*4	MS21920-22	CLAMP
18						*2	MS21920-25	CLAMP (OR MS21920-24)
19	4	4	4		4		AN5-32A	BOLT
20				4		4	AN5-34A	BOLT
21	4	4	4	4	4	4	MS21042L5	NUT (OR MS21042-5)
22	8	8	8	8	8	8	NAS1149C0563J	WASHER (OR AN960JD516)
23						*2	D3190-1	CHAFING SHIELD
40	*2		*2	*2	*2	*2	D2873-043	NUT PLATE
41	*2		*2	*2	*2	*2	D2873-045	NUT PLATE
42		2					D2872-043	NUT PLATE
43		2					D2872-045	NUT PLATE
44	10		10				AN5-7A	BOLT
45		10		10	10	10	AN5-10A	BOLT
46	4	10	4		4		AN5-30A	BOLT
47				4		4	AN5-32A	BOLT
48			12				AN970-4	WASHER (OPTIONAL)
49		6					MS21042L5	NUT (OR MS21042-5)
50	10	12	10	10	10	10	NAS1149C0563J	WASHER (OR AN960JD516)
60		1					D3039-3	CENTER DRILL (TOOLING, NOT INSTALLED)

\*REFERENCE ONLY. PARTS ARE INCLUDED IN D206-667-141/-143/-241/-243 & D407-667-145/-245  
ASSEMBLIES ABOVE

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Revision: D

Date: 11.05.01



# LIQUID PENETRANT TEST REPORT

P- 05631

PAGE 1 OF 1

CLIENT

DART AEROSPACE

DATE

OCT-05-2011

TIME

AM

PM

ATTENTION

LYDIA/CHANTALE/IAN/MATT

ACUREN JOB NO.

188-11-02189

ADDRESS

1270 ABERDEEN ST.  
HAWKES BURY, ON

PO/NO.

15101

WORK LOCATION

AS ADDRESS

ACCEPTANCE STD.

ASTM1417/CS1038

REV./DATE

2005

PROJECT

PT WET FLUORESCENT ON 6 "CROSSTUBES"

ITEM(S) EXAMINED

- SEE BELOW -

JOB DESCRIPTION

PROCEDURE NO. LT-002

REV./DATE

2007

TECHNIQUE NO. LT-002

REV./DATE

2007

PART NO.

MATERIAL

ALODINE ALUMINUM

THICKNESS

N/A

SCOPE

PERFORMED A WET FLUORESCENT LIQUID PENETRANT INSPECTION ON 100% OF THE EXTERNAL SURFACE OF ITEMS MENTIONED BELOW

## TEST DETAILS

METHOD	<input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH	<input type="checkbox"/> SOLVENT REMOVABLE	<input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND	MAGNAFLUX		BLACK LIGHT S/N	13798	<input checked="" type="checkbox"/> OUTPUT > 1000 $\mu$ W/cm <sup>2</sup>
PENETRANT	ZL-67	MINIMUM DWELL TIME	10 MIN.	LIGHTING EQUIP.	<input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT <input type="checkbox"/> OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER	H <sub>2</sub> O	MINIMUM DRY TIME	> 10 MIN.	OTHER	
DEVELOPER	SKD-32	MINIMUM DWELL TIME	10 MIN.	LIGHT METER S/N	
DEVELOPER TYPE	<input type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS <input type="checkbox"/> DRY			CAL DUE DATE	Aug/2012

## TEST SURFACE

SURFACE CONDITION	<input type="checkbox"/> AS GROUND	<input type="checkbox"/> AS WELDED	<input type="checkbox"/> MACHINED	<input type="checkbox"/> SHOT BLASTED	<input checked="" type="checkbox"/> CLEAN BARE METAL
SURFACE TEMPERATURE	<input type="checkbox"/> < - 4°C/ 20°F	<input type="checkbox"/> - 4°C/ 20°F TO 10°C/50°F	<input checked="" type="checkbox"/> 10°C/50°F TO 52°C/125°F	<input type="checkbox"/> > 52°C/125°F	

RESULTS- (☐ METRIC ☐ IMPERIAL)

1 CROSSTUBE W.O. ID 73041  
2 74331  
3 72708  
4 70709  
5 70720  
6 70721

ITEM ID D212-664-101 FWD  
D212-664-101 FWD  
D206-667-103 FWD  
D206-667-103 FWD  
D206-667-203 AFT  
D206-667-203 AFT

NO RELEVANT INDICATION WAS DETECTED  
AS PER APPLICABLE STANDARDS

11-10-06

## Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

## Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

## SIGNATURES

CLIENT REPRESENTATIVE

Matthew Stanek

PRINT

Matthew Stanek

SIGNATURE

DTR # E 44759

TECHNICIAN (SIGNATURE):

YVES DESIGES

1<sup>st</sup> TECHNICIAN

2<sup>nd</sup> TECHNICIAN

NAME (PRINT):

CGSB LEVEL 3 SNT LEVEL 2  
CGSB REG. NO. 3049

CGSB LEVEL 3 SNT LEVEL 2  
CGSB REG. NO. 3049

REPORT

REVIEWED BY:

NAME

INITIALS